

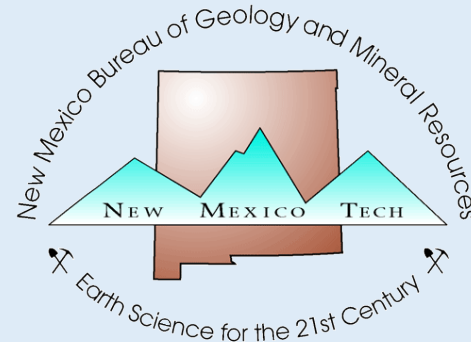
# Aquifer Mapping Program

Middle Rio Grande  
Council of Governments  
May 2018

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Aquifer Mapping Program Manager*

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***[geoinfo.nmt.edu](http://geoinfo.nmt.edu)***

# New Mexico Bureau of Geology and Mineral Resources

*We are a research and service division of New Mexico Tech (under Higher Education).  
We serve as the geological survey for the state.*

## Divisions of our agency

### Energy

- Oil/Gas
- Geothermal

### Mineral/Economic

### Laboratories

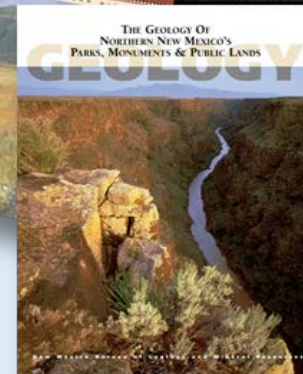
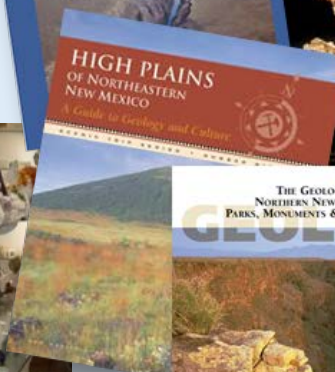
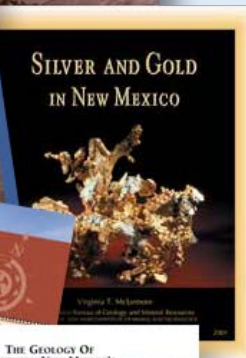
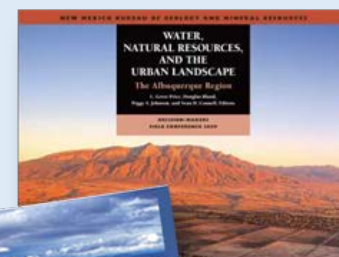
### Outreach and education

- Publications
- Archives and collections
- Geothermal

### Geologic mapping & hazards

### Hydrogeology

### (Aquifer Mapping Program)



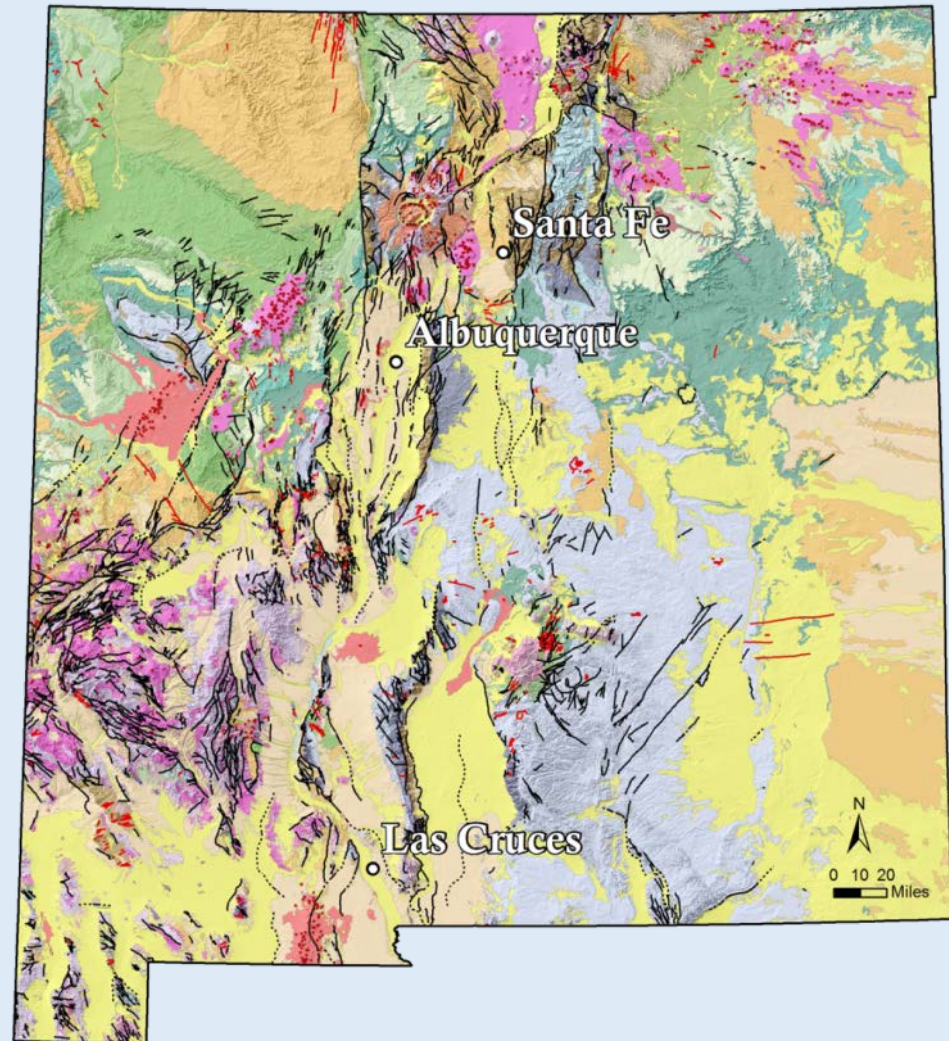
# Aquifer Mapping Program

Frequently asked questions in New Mexico

- Where is the groundwater?
- How much is there?
- What is the water quality?

Answers require understanding of the **complex geology** of our state. We can address issues using NMBGMR resources:

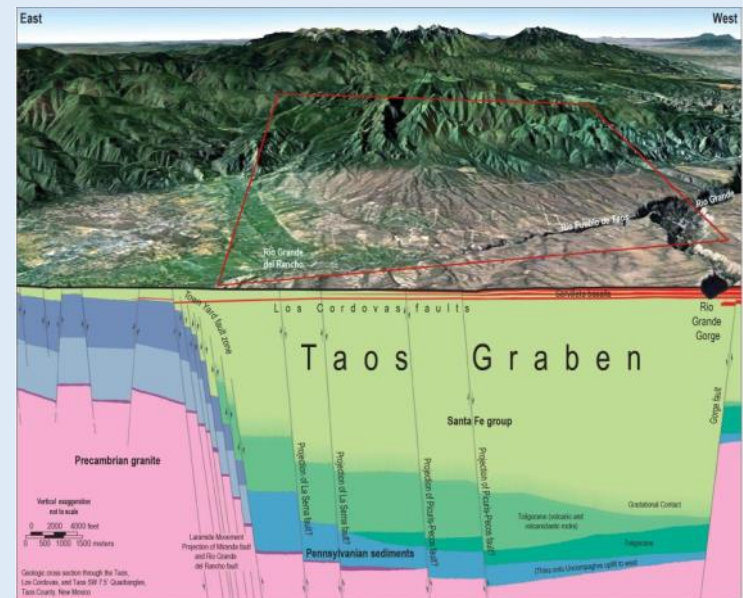
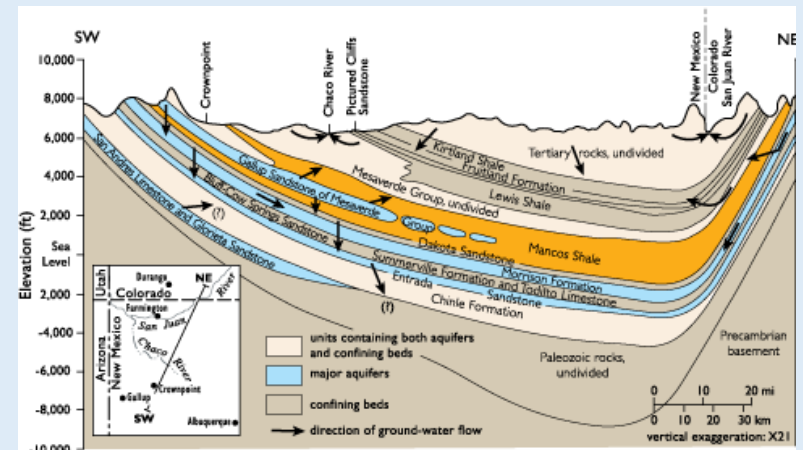
- Geologic mapping
- Drill hole data
- Geophysical surveys
- Hydrologic data
- Geochemistry
- Groundwater conceptual models



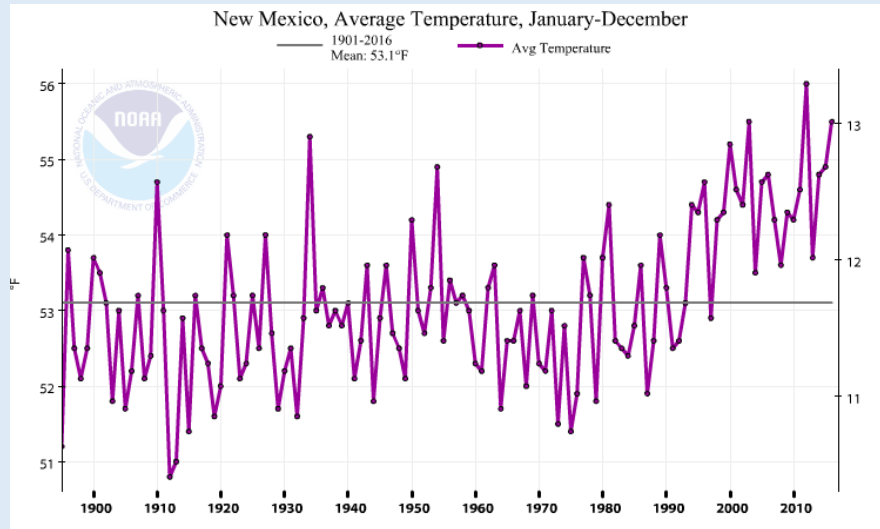


# Groundwater quantity and quality: it begins with the geology

- Aquifer thickness (relates to available storage)
- Depth to groundwater
- Rocks effects on water quality
- How rock will transmit water
  - Hydraulic conductivity
  - Transmissivity
- Estimates of specific storage
- Connections with surface water
- Where recharge occurs



# Future of Water in New Mexico



## A more ARID New Mexico

- Warmer temperatures
- Long term drought conditions
- Increased evapotranspiration rates
- Reduction in surface water flow and recharge to groundwater
- Increase demand on groundwater
- Increased vulnerability!

# What is Aquifer Mapping?

**Aquifer mapping** is a scientific process applying a combination of geologic, geophysical, hydrologic, and chemical field and laboratory analyses to characterize the quantity, quality, and sustainability of groundwater in aquifers.

- NON-REGULATORY APPROACH
- IMPARTIAL DATA; UNBIASED INTERPRETATIONS
- RESULTS THAT INFORM DECISION MAKING AND SUPPORTS OTHER FEDERAL, STATE, TRIBAL AND LOCAL AGENCIES/INDIVIDUALS

## FUNDING 2017-2018 FY

- HYDROGEOLOGY PORTION OF NMBGMR BUDGET **(\$280K)**
- LEVERAGED WITH GIFTS AND GRANTS **(\$480K)**

USED TOWARD BETTER UNDERSTANDING OF OUR WATER RESOURCES



# Aquifer Mapping Program 2018

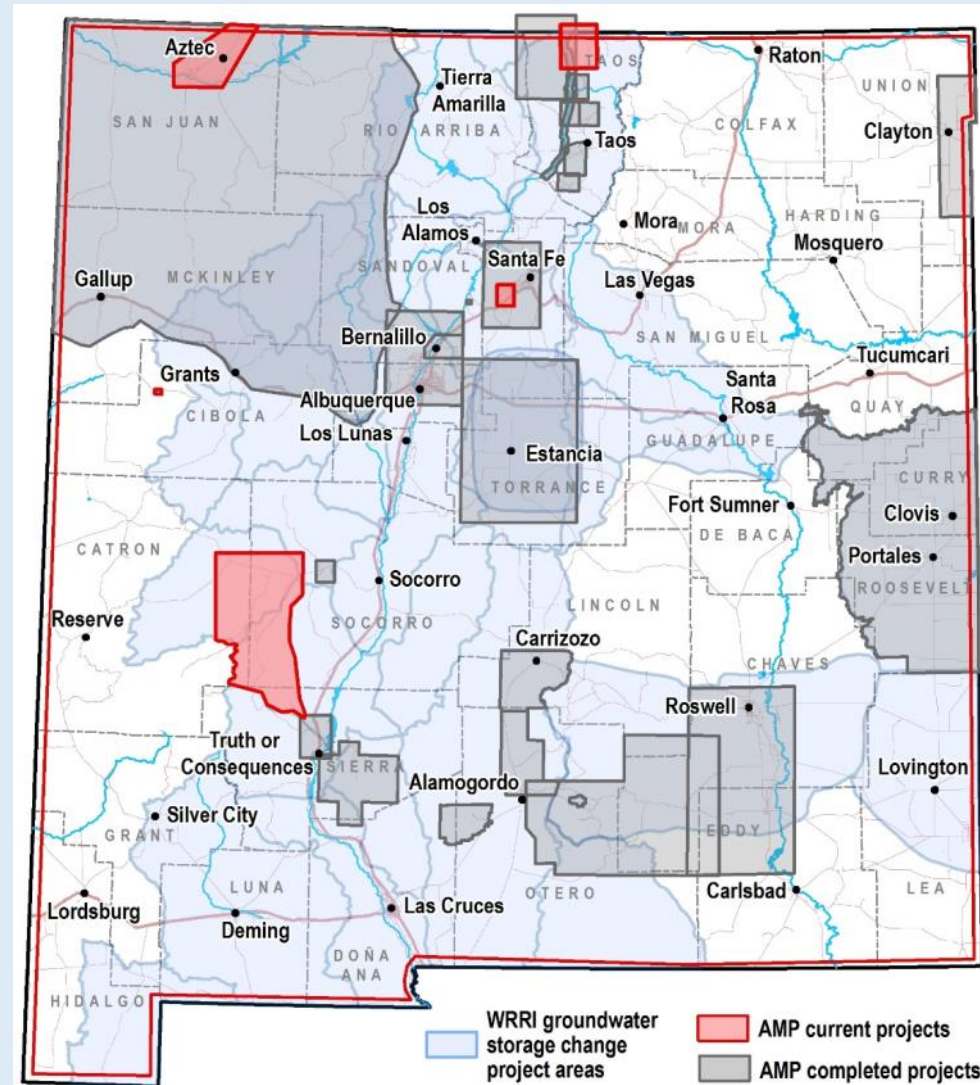
## Current projects

- Animas River aquifer long term monitoring (NMED-EPA funding)
- San Agustin Plains (NMBG)
- Groundwater level monitoring in La Cienega (Las Golondrinas – community)
- Aquifer map 3D visualizations (Healy Foundation)
- Collaborative groundwater level monitoring (Healy Foundation)

## Recent projects

- Groundwater level and storage changes (WRII)
- Statewide groundwater recharge model (WRII)
- Clovis Region Aquifer Lifetime Mapping (Clovis, Curry Cty, ENMWUA)

(Primary funding sources in parentheses)



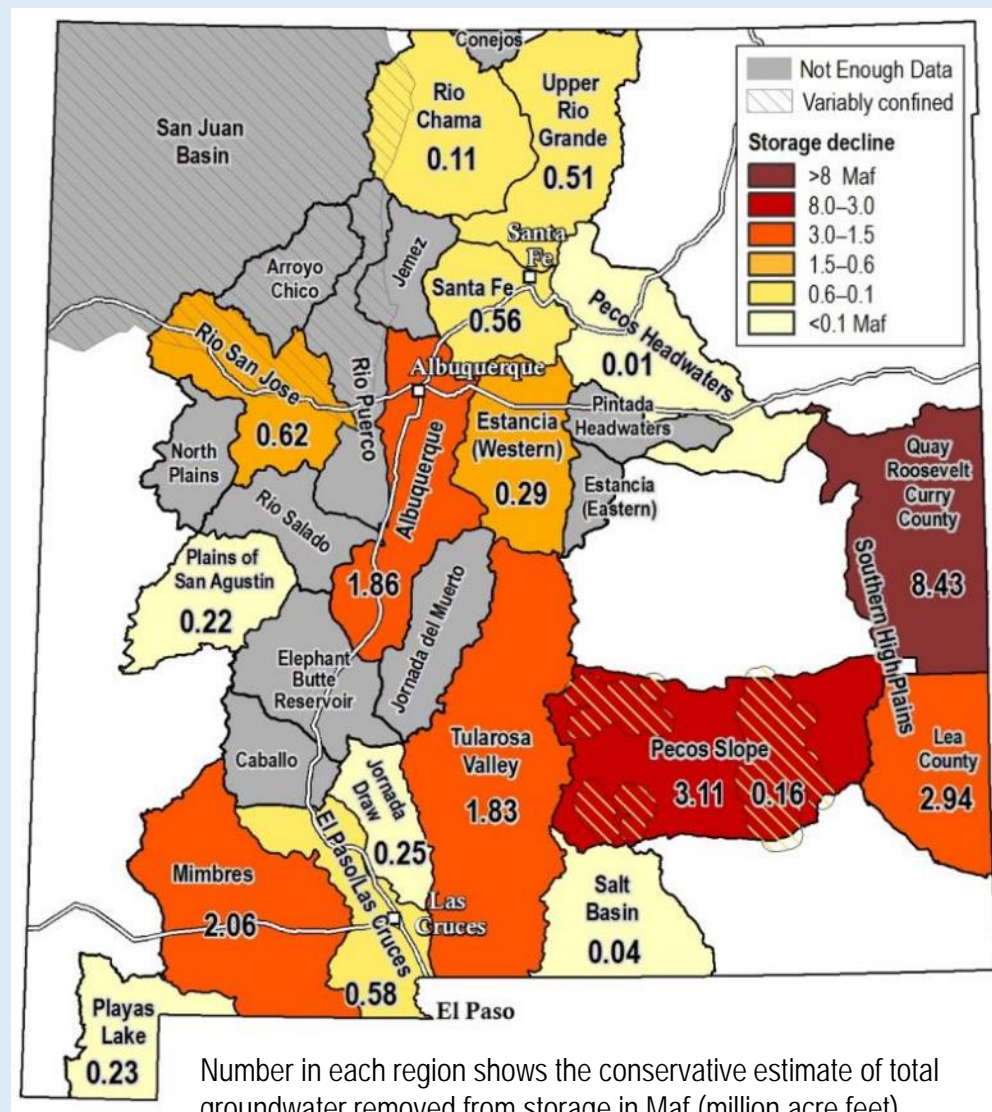
# Groundwater Level and Storage Changes

## Funding from WRRRI Statewide Water Assessment 2014-2017

Project lead: Dr. Alex Rinehart  
NMBGMR – AMP

## Results

- A geostatistical analysis entirely based upon **groundwater level monitoring network** from USGS/OSE/NMBG since 1900s
- Large groundwater storage declines in Eastern NM, Pecos Slope, Mimbres, Tularosa, Albuquerque, and Mesilla Basins.
- Results are **likely low estimates** due to well network and sparse data coverage



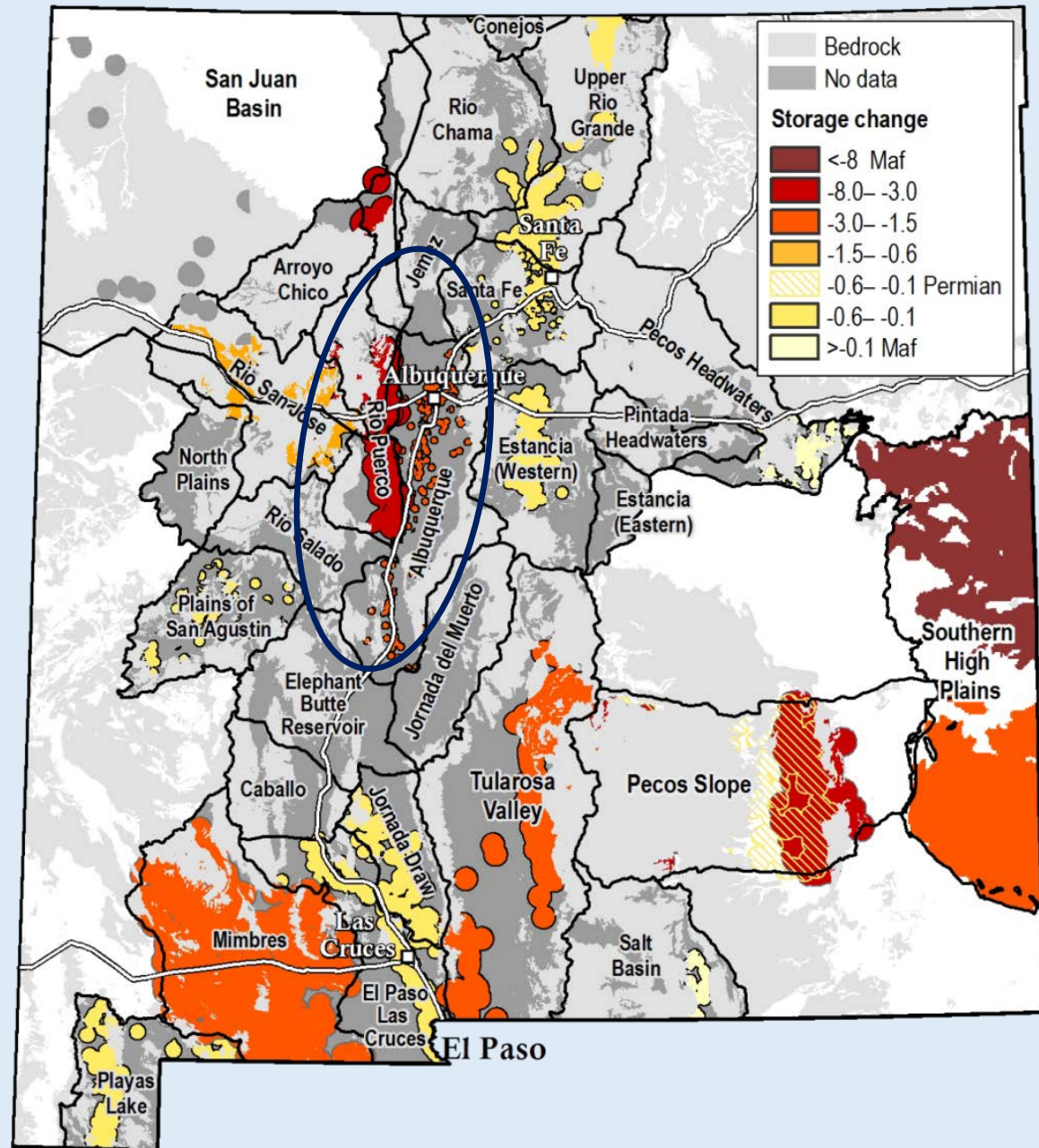
Number in each region shows the conservative estimate of total groundwater removed from storage in Maf (million acre feet).

Grey = lack sufficient data

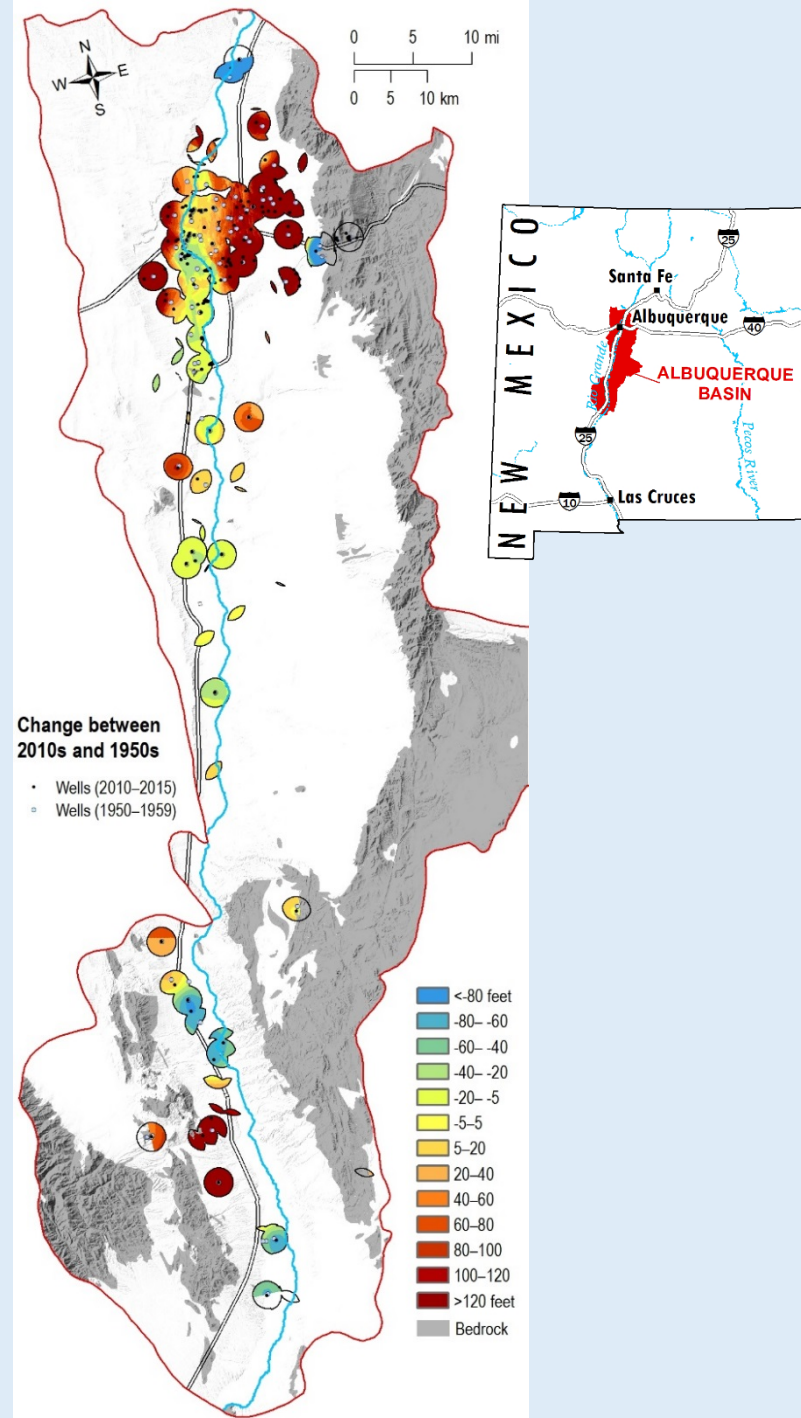
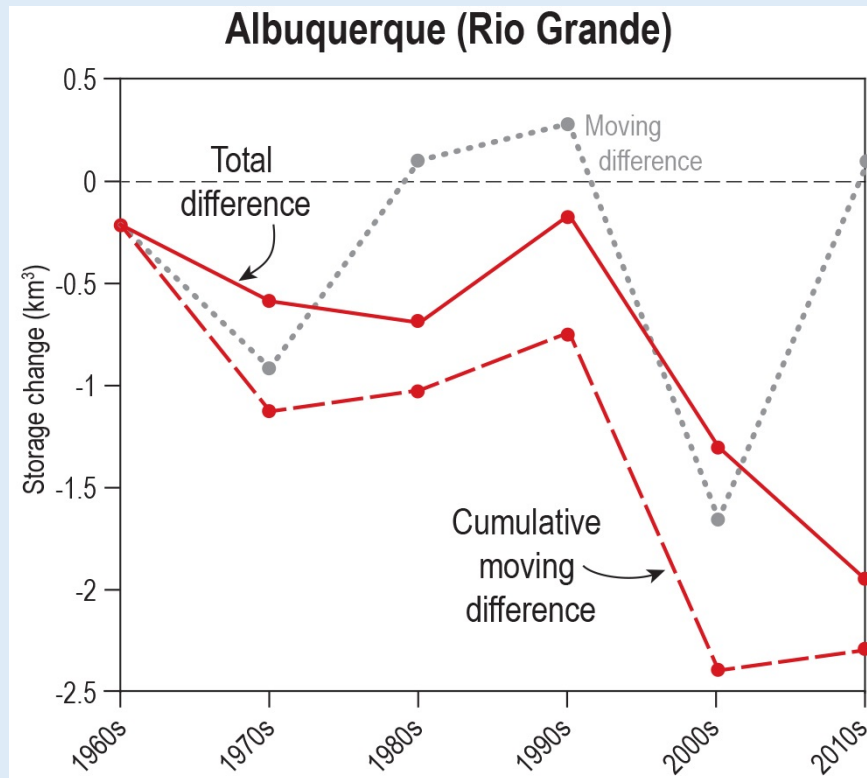


# Albuquerque Basin

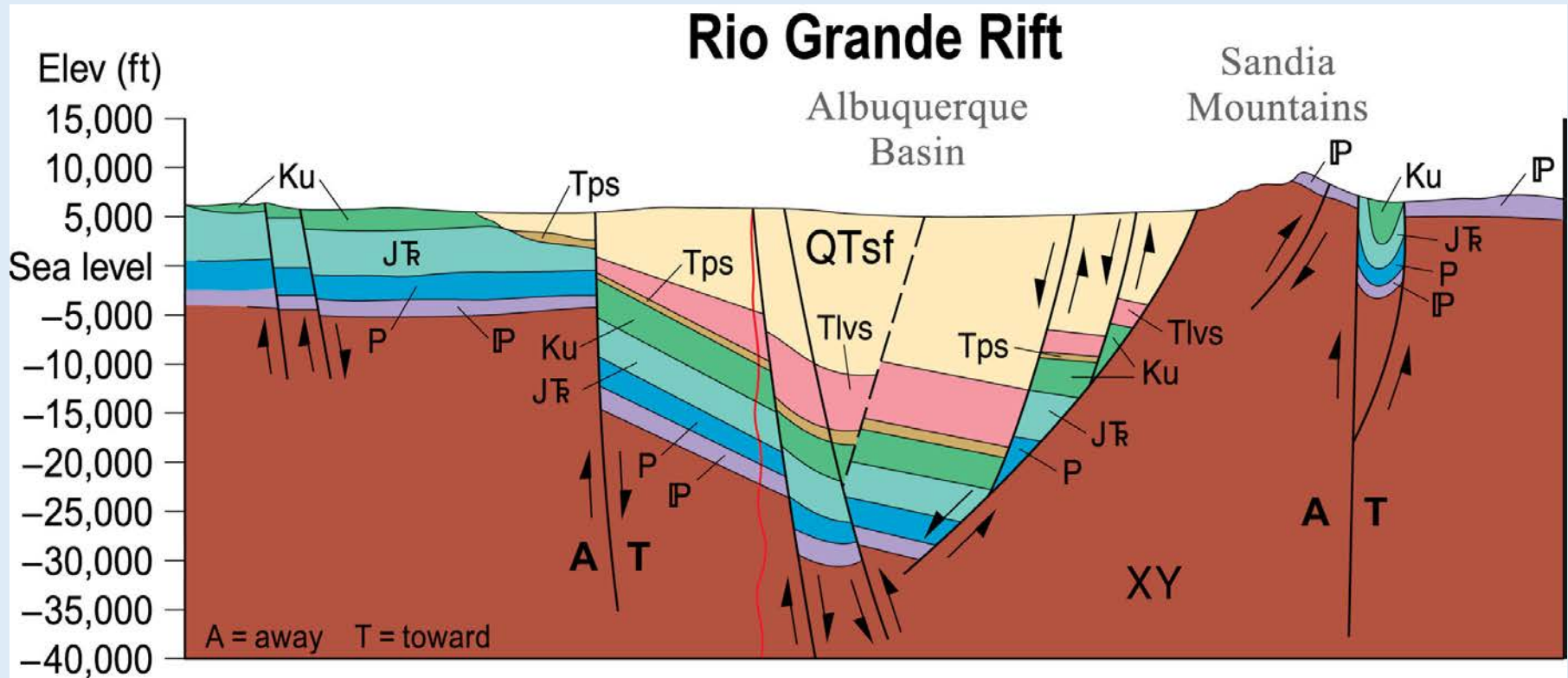
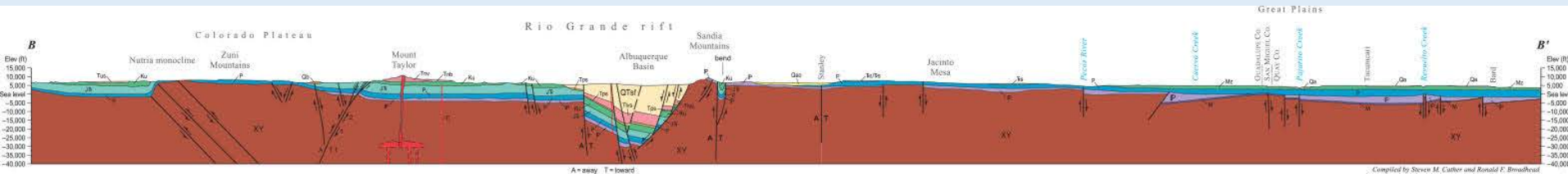
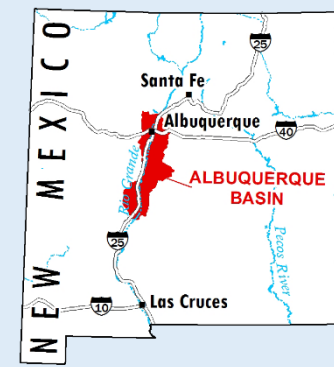
- Reliant on combination of surface water and groundwater
- Primary aquifer is in **basin-fill (100s to 2000 ft)**, with deeper wells on basin flanks and shallower wells in valley bottom
- Major population center, but still has significant agriculture.



# Albuquerque Basin



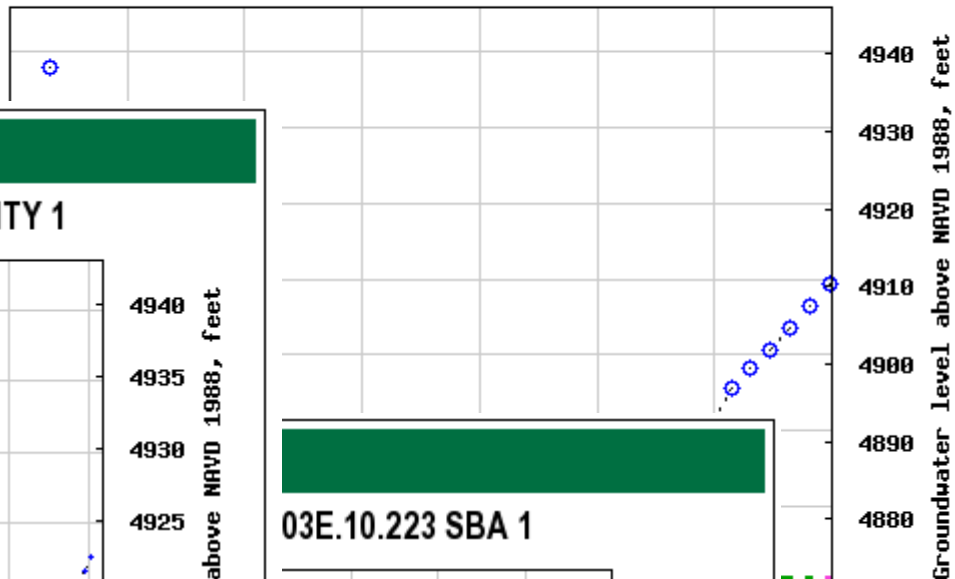
# Albuquerque Basin



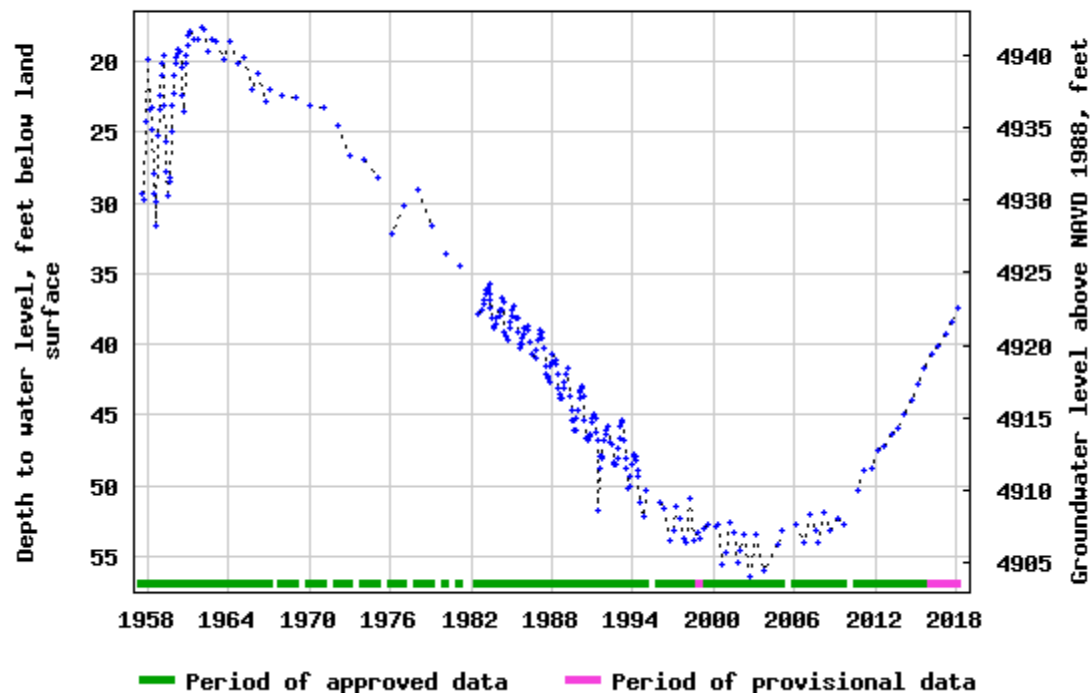


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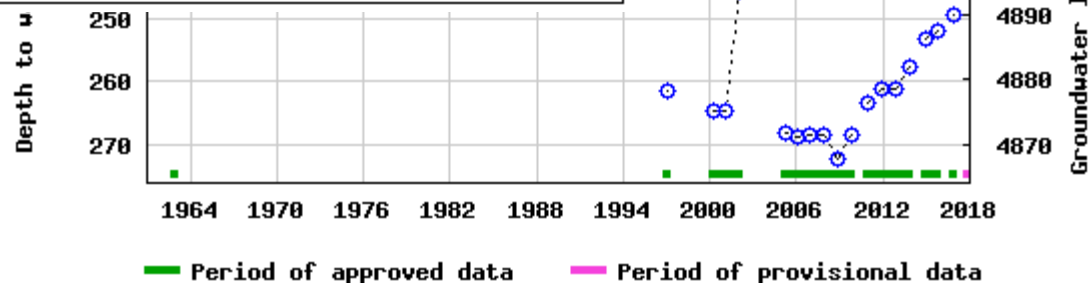
Land 698



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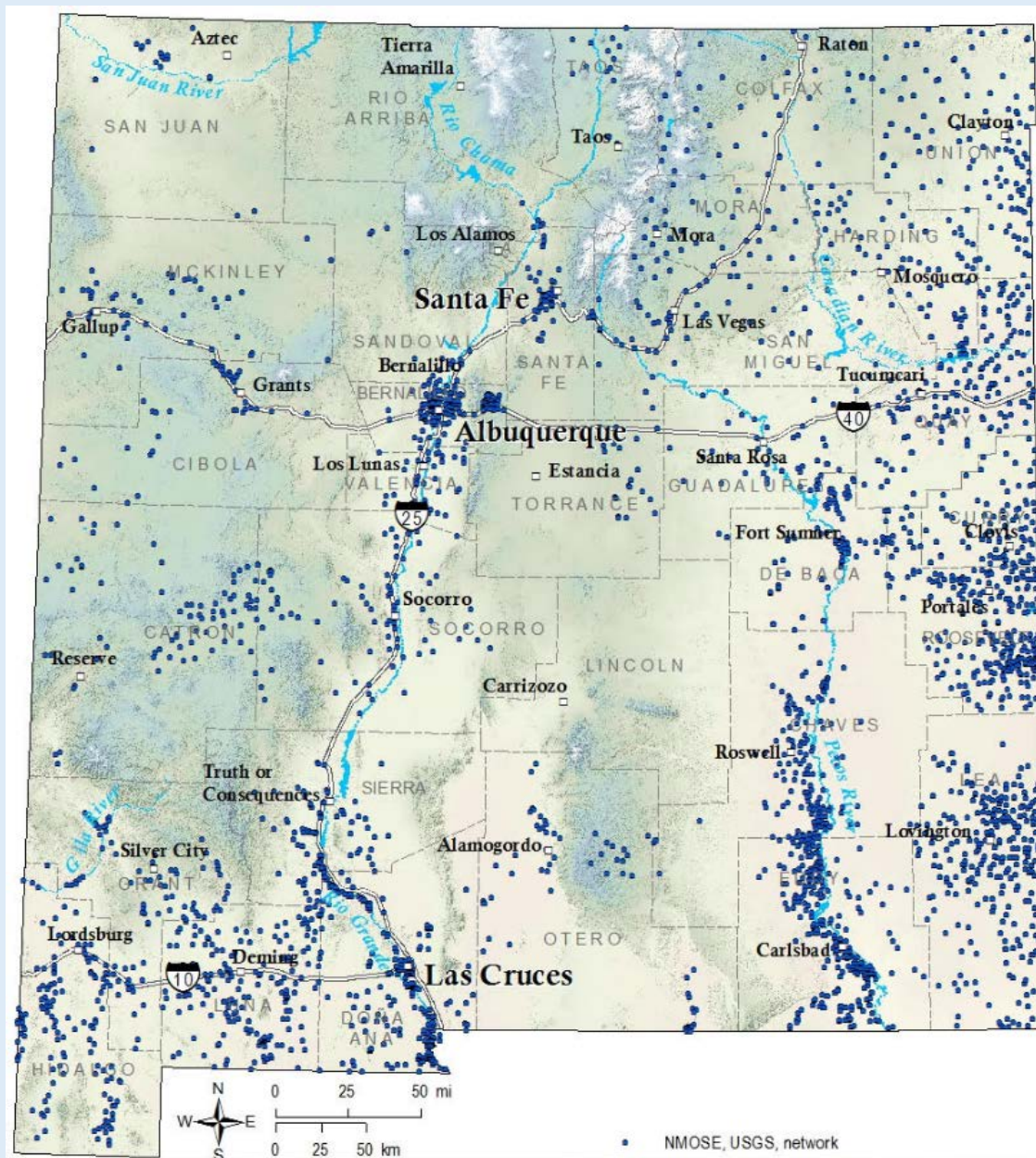
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# OSE/USGS Groundwater Monitoring Network in NM

Blue points are part of the once per year or per 5 year monitoring network currently operated by OSE/USGS

Long term data – these are *essential* in tracking the trends in groundwater level and storage changes





# Collaborative Groundwater Monitoring Network

## ➤ DATA COLLECTION

- Focus on groundwater data to rural communities, especially those on a single well
- Filling in data gaps in state monitoring network (OSE/USGS, 1-5 year rotating network)
- Cooperating with communities, private well owners, NM Rural Water Association, NMED, OSE, and USGS

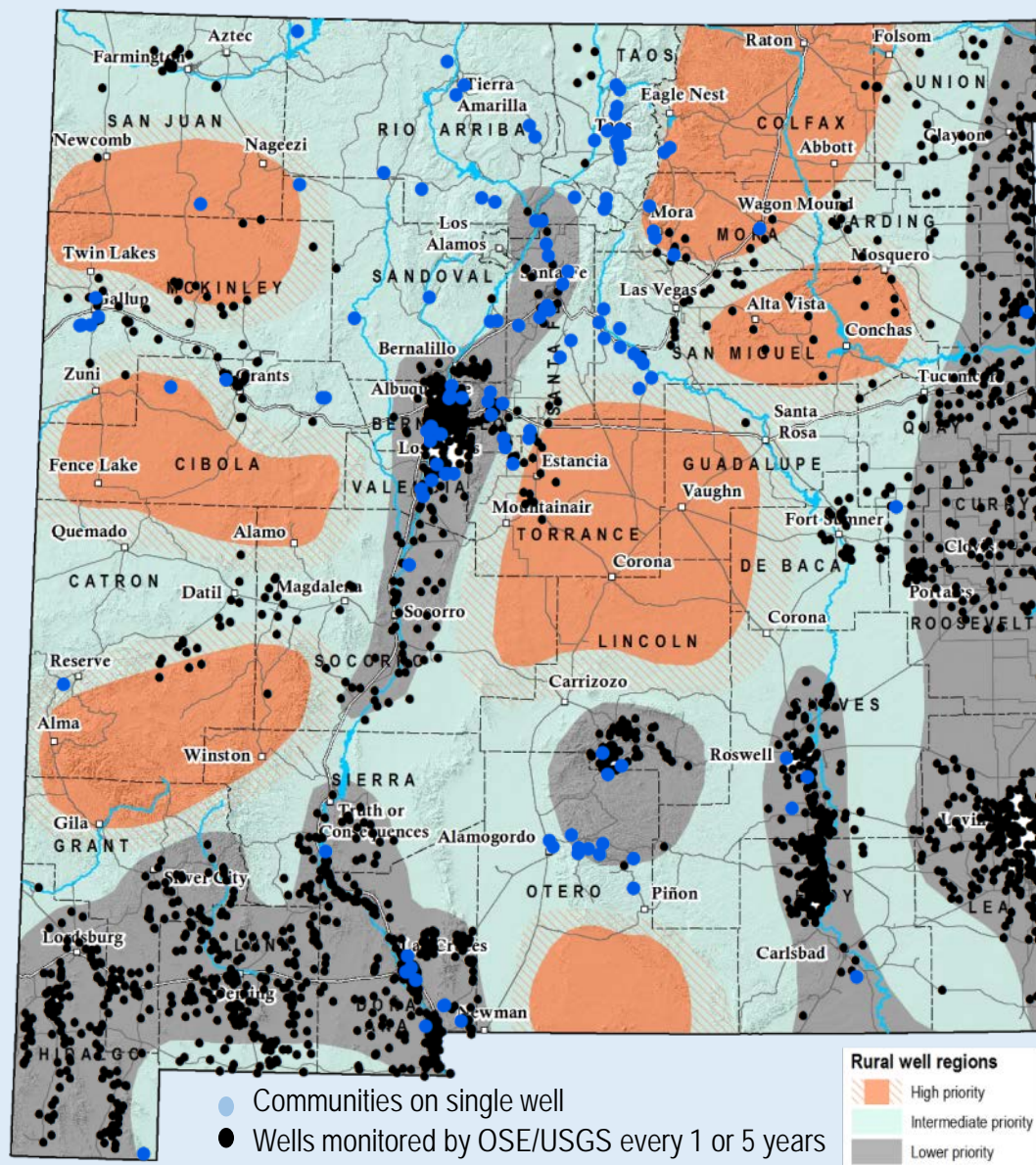
## ➤ TRAINING and EDUCATION

- On-site
- NM Rural Water Association annual meetings

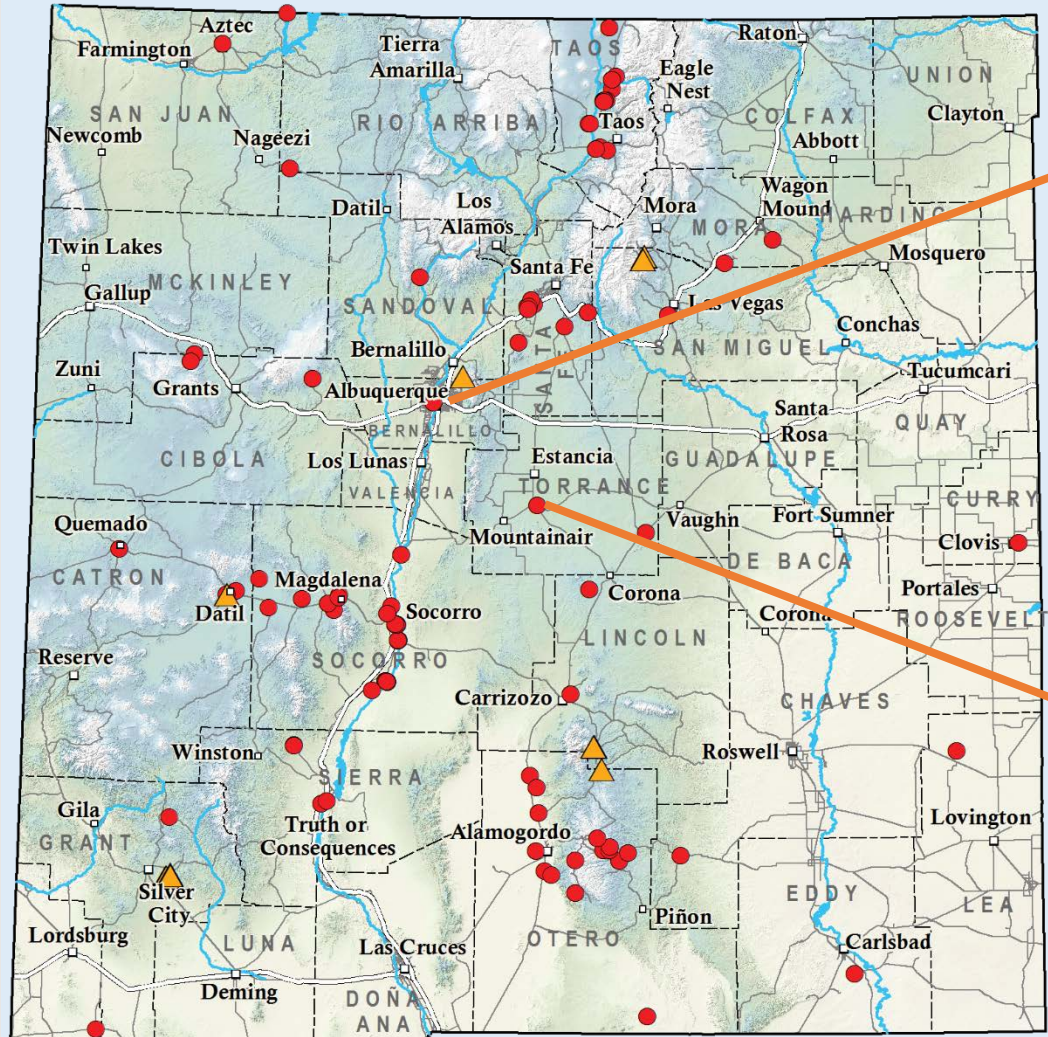
## ➤ PUBLIC ACCESS/ARCHIVE

- Interactive webmap ([geoinfo.nmt.edu](http://geoinfo.nmt.edu))
- Upon request

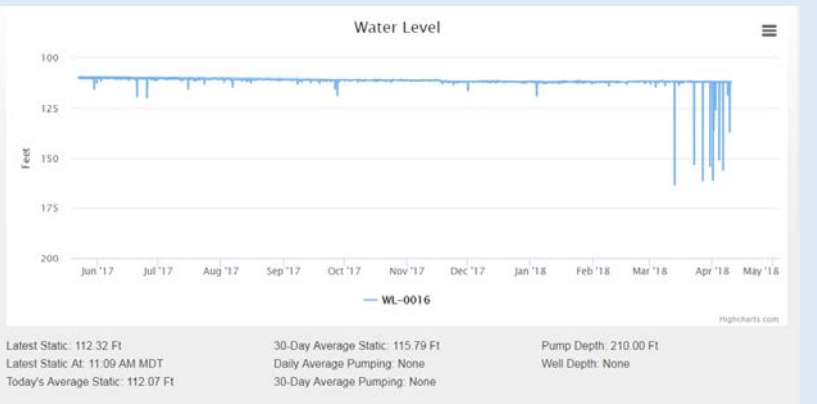
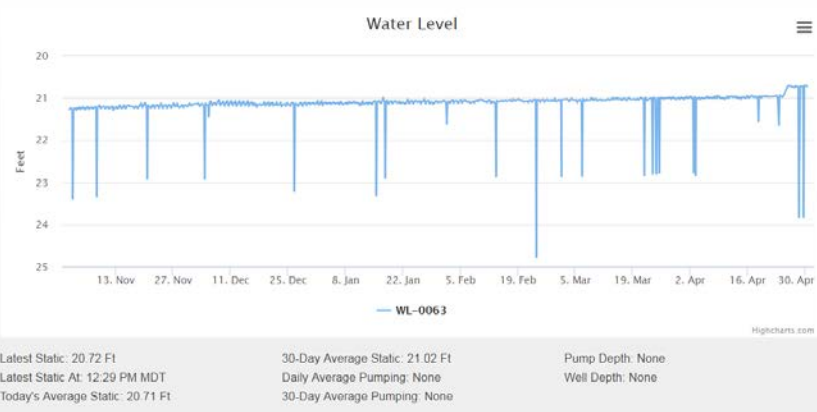
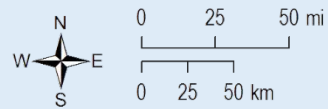
Funding from Healy Foundation







- Well sharing
- Data sharing





# Collaborative Groundwater Monitoring Network



## DATA SHARING

A well owner/operator can submit accurate water level measurements to NMBGMR database to become publicly available data.

## FREE PROGRAM!

- If well is in “key” location, fits rural criteria and works well with our equipment, we will install groundwater level monitoring equipment – for FREE!
- We will take manual measurements - for FREE!
- We will archive YOUR data - for FREE!



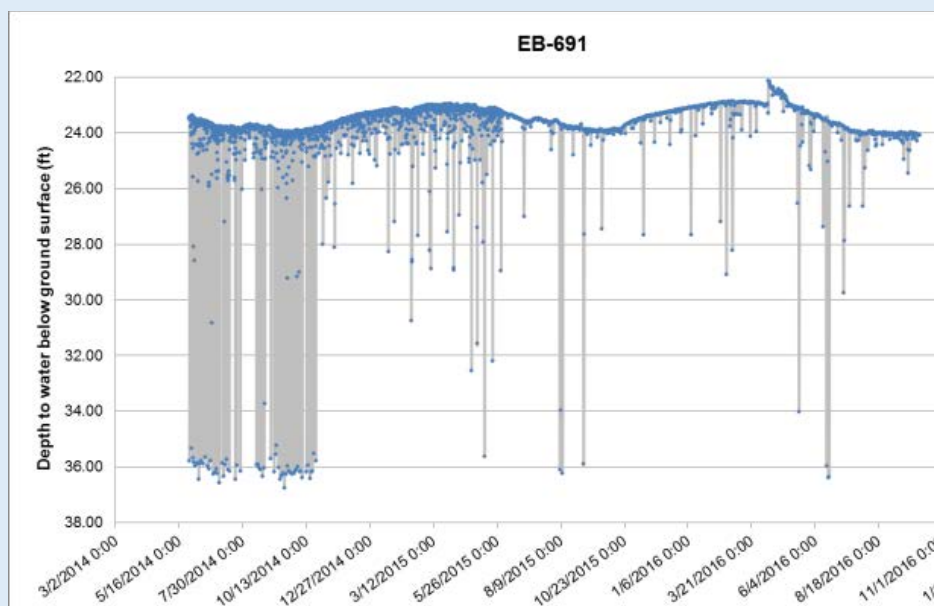
## WELL SHARING

NMBGMR can visit site and, if well is appropriate, we can set up equipment for continuous water level measurement.



# Continuous pressure transducers

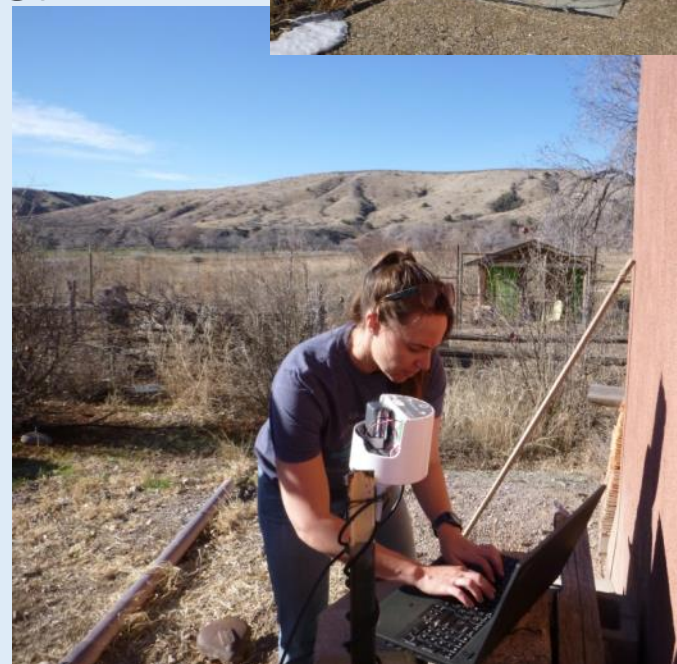
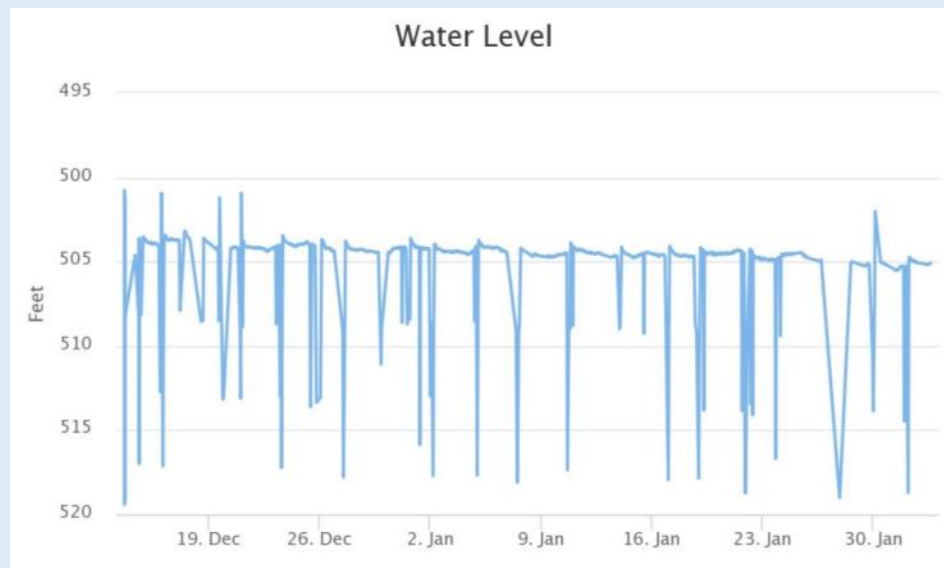
- Small data recorder sits in water
- Must be retrieved and downloaded periodically
- Requires open well, or monitoring tube





# Continuous acoustic technology

- Acoustic water level measurement (WellIntel)
- Nothing touches water
- Data must be fed to internet based cloud
- Real-time or remote data recorder



# Training



*"New Mexico Rural Water Association is proud of our partnership with New Mexico Bureau of Geology and their Aquifer Mapping Program. Their work in the field, as well as their training in the classroom, brings a new level of knowledge and awareness to water systems around New Mexico about the importance of monitoring and managing their drinking water supplies for the benefit of their customers and communities."*

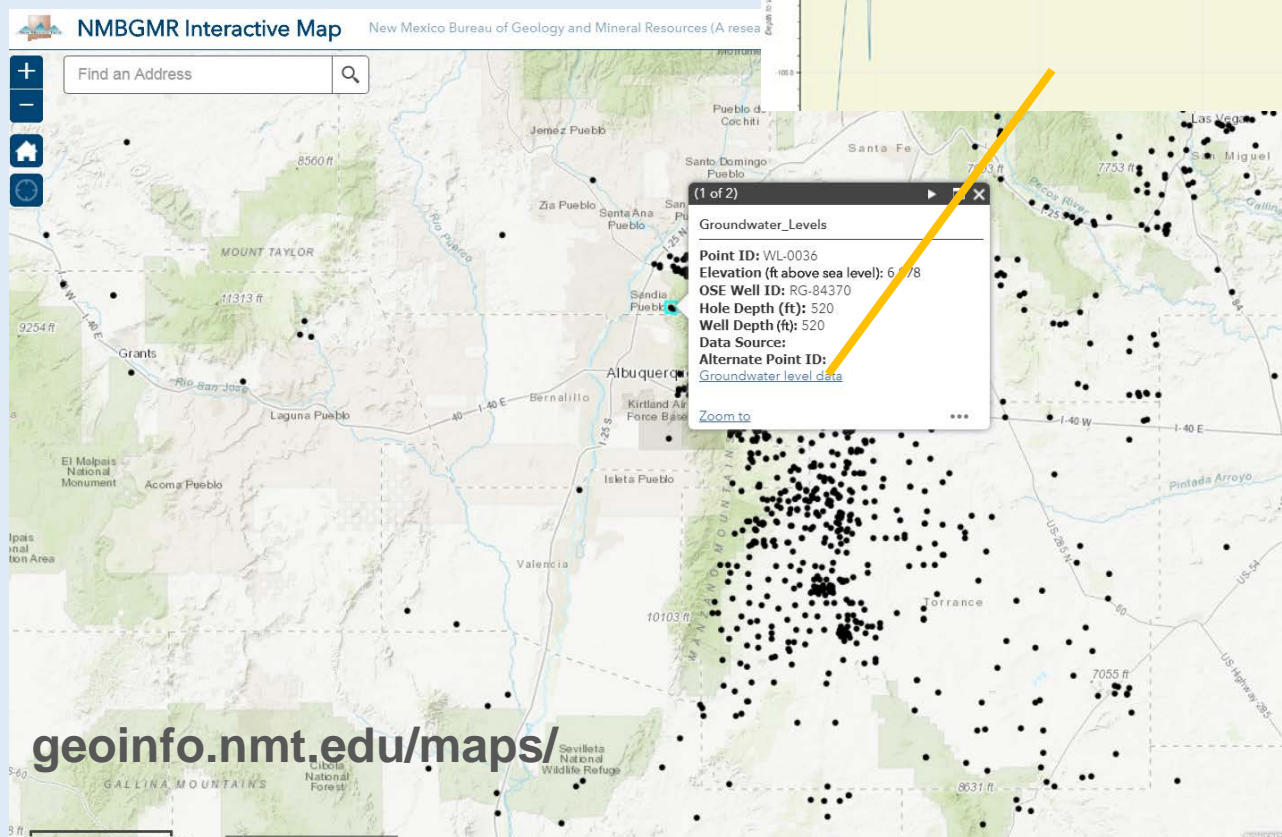
-B. Conner, Executive Director NMRWA





# Where are we going with this?

- Public data for greater visibility
- Webmap – making data accessible
- Improve groundwater awareness and public education





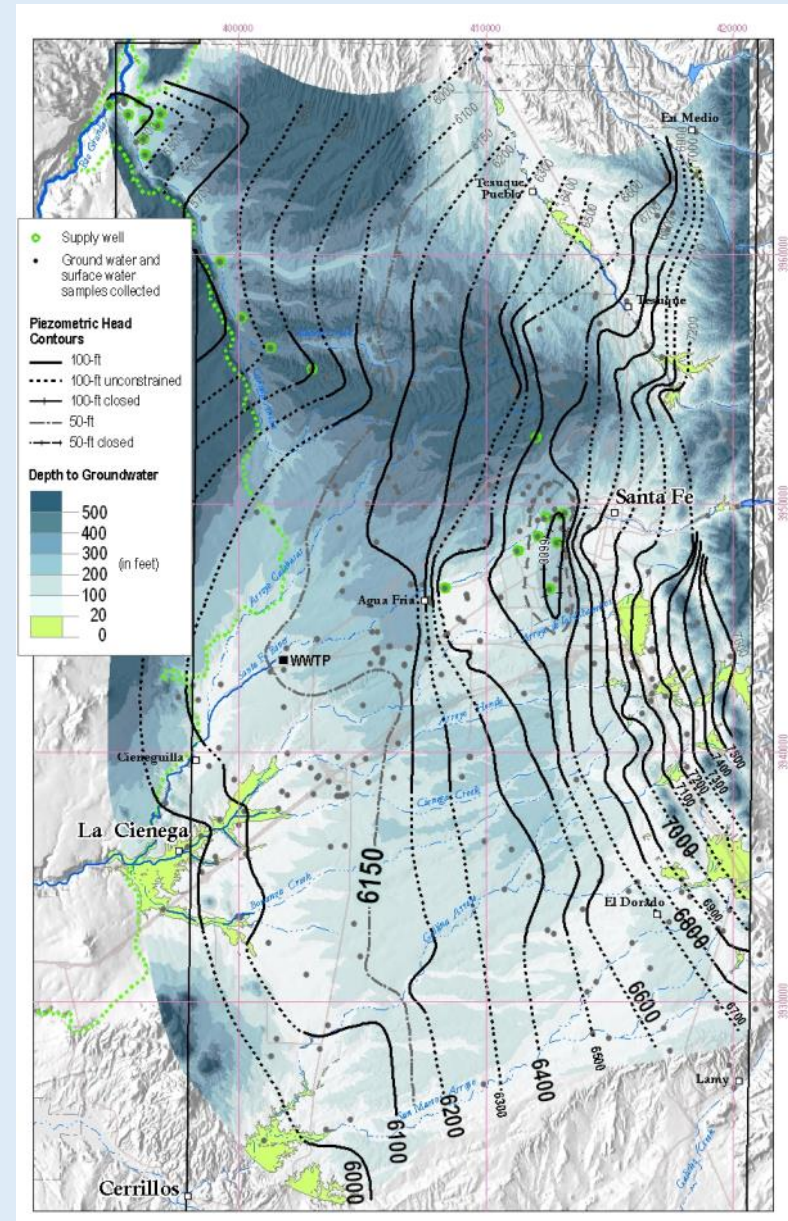
# 3D Aquifer Mapping

## The challenge

Develop statewide coverage of aquifer maps that provide details on depth of productive aquifers and the boundaries or connections of aquifers.

## Our basic method

1. Compile existing datasets to improve conceptual models of basins
2. Develop regional maps, piece together statewide eventually (5+ years)
3. Technical and non-technical easy-to-access material

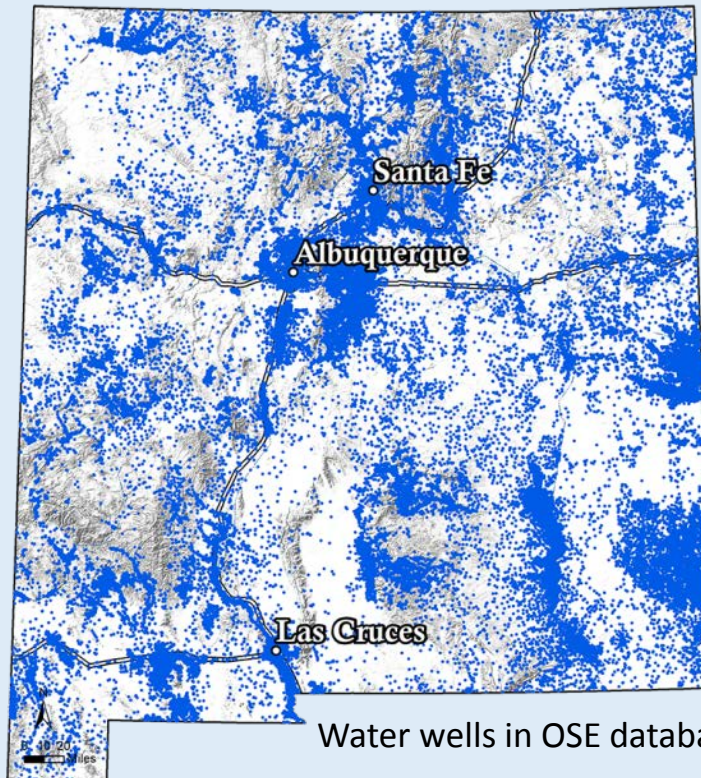




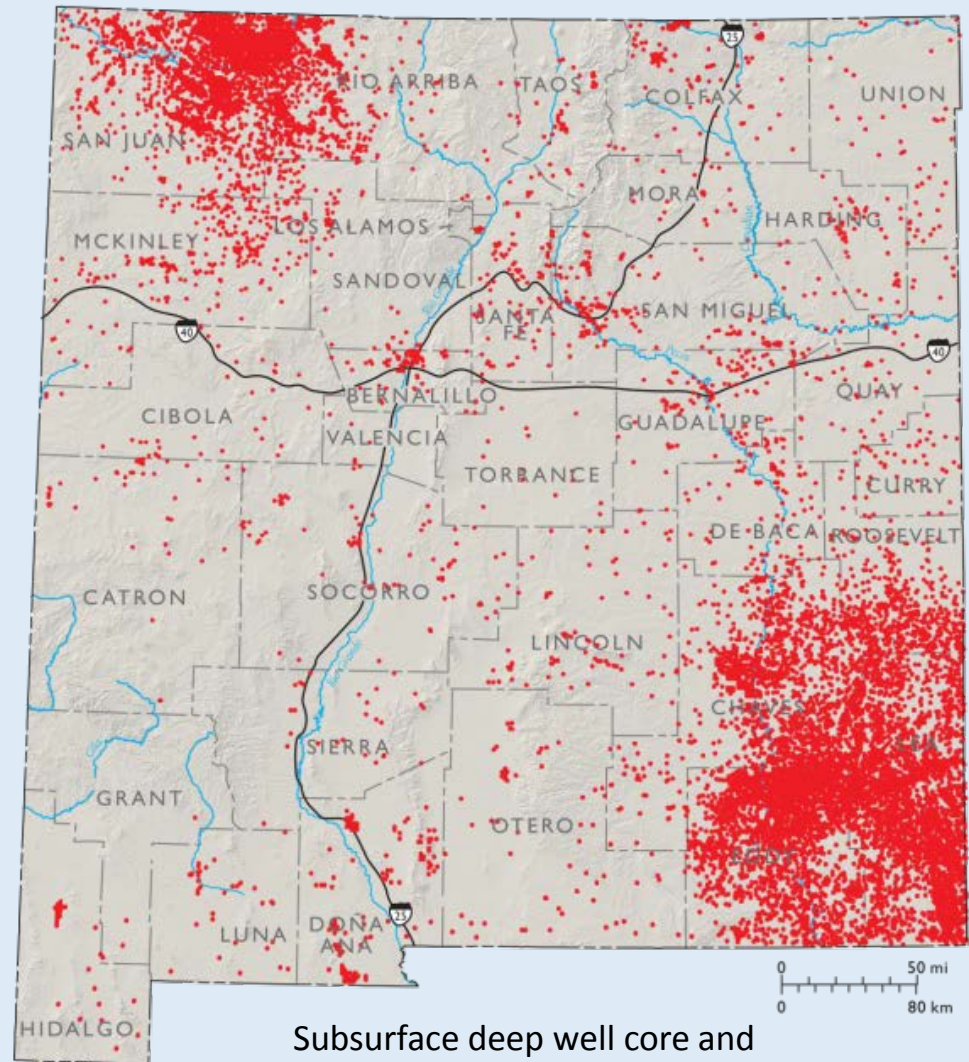
# 3D Aquifer Mapping

## Compile existing datasets

- Geology and cross sections
- Previous work/reports
- Wells from multiple databases
- No new data collection



Water wells in OSE database



Subsurface deep well core and cuttings at Bureau of Geology

# Online aquifer information



Water Resources   Aquifer Mapping Program   Projects   Publications & Data

## HYDROGEOLOGIC PROJECTS IN NEW MEXICO

### Statewide studies

*(click link below to view project details)*

- The collaborative groundwater monitoring network
- Development of 3D Aquifer Maps
- Assessment of spatiotemporal groundwater level changes
- Brackish water assessments in New Mexico
- Recharge data compilation and recharge area identification

## Non-technical products



### Groundwater in New Mexico [↗](#)

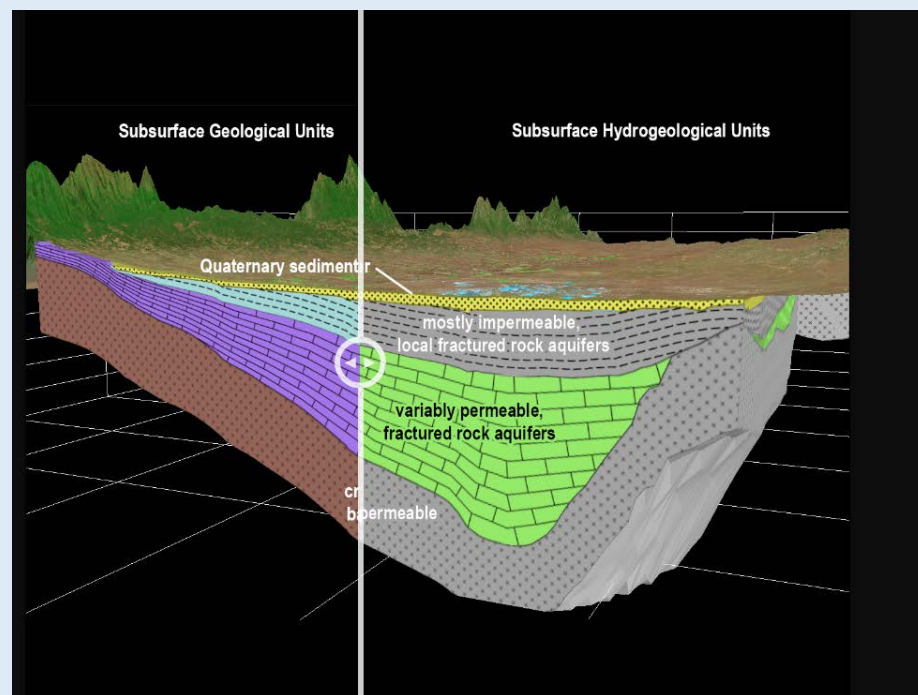
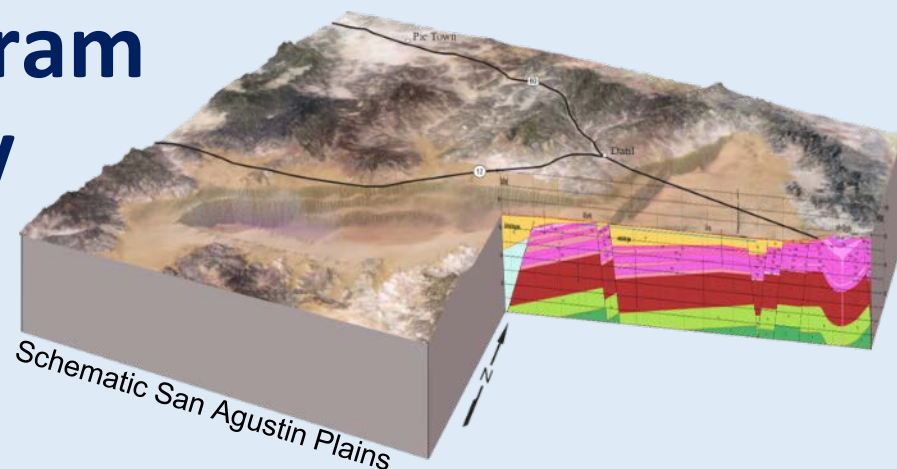
Our precious shared resource



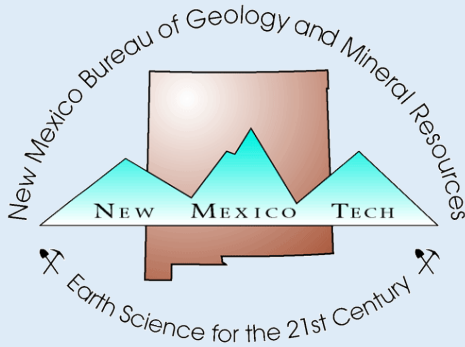
# Aquifer Mapping Program NM Bureau of Geology

Using our geologic resources  
to better understand  
our water-limited reality

- Building better maps and information on groundwater resources, availability, and recharge
- Expanding basic groundwater monitoring – keeping an eye on the “account balance”
- Improving New Mexico’s understanding of our water resources



# For More Information



[geoinfo.nmt.edu](http://geoinfo.nmt.edu)

**Come visit us!**

[stacy.timmons@nmt.edu](mailto:stacy.timmons@nmt.edu)

